ORDER NO. AD8904080C8

Service Manual

Tuner

QUARTZ Synthesizer
LW/MW/FM Stereo Tuner

ST-X933L

Color

(K)	Black Type

Area

Country Code	Area	Color
(E)	Continental Europe	(K)
(EB)	Great Britain	(K)
(GC)	Saudi Arabia	(K)
(GN)	New Zealand	(K)

SPECIFICATIONS

(DIN 45 500)

■ FM TUNER SECTION

Frequency range	87.50~108.00 MHz (0.05 MHz-steps)
Sensitivity	1.5 µV (IHF, usable)
S/N 30 dB	1.3 µV (75Ω)
S/N 26 dB	1.2 µV (75Ω)
S/N 20 dB	0.9 µV (75Ω)
IHF 46 dB stereo quieting sensitivity	28 µV / 75Ω
Total harmonic distortion	
MONO	0.15%
STEREO	0.3%
S/N	
MONO	70 dB (78 dB,IHF)
STEREO	65 dB (71 dB,IHF)
Frequency response	20 Hz ~ 15 kHz, +0.5 dB ~ -1.5 dB
Alternate channel selectivity	
±400 kHz	65 dB
Capture ratio	1.0 dB
Image rejection at 98 MHz	46 dB
IF rejection at 98 MHz	70 dB
Spurious response rejection at 98 MHz	70 dB
AM suppression	55 dB
Stereo separation	
1 kHz	40 dB
10 kHz	30 dB
Carrier leak	
19 kHz	-30 dB (-35 dB,IHF)
38 kHz	-45 dB (-50 dB,IHF)
Channel balance (250 Hz ~ 6,300 Hz)	± 1.5 dB
Limiting point	1.2 µV
Bandwidth	
IF amplifier	180 kHz
FM demodulator	1000 kHz
Antenna terminals	75Ω (unbalanced)

■ AM TUNER SECTION

Frequency range	
MW	522 kHz ~ 1611 kHz (9 kHz-steps)
	530 kHz ~ 1620 kHz (10 kHz-steps)
LW	155 kHz ~ 353 kHz (9 kHz-steps)
	153 kHz ~ 351 kHz (-2 kHz shift)
Sensitivity (S/N 20 dB)	
MW	20 µV,300 µV/m
LW	50 µV
Selectivity (± 9 kHz)	
MW (at 999 kHz)	55 dB
LW (at 254 kHz)	55 dB
Image rejection	
MW (at 999 kHz)	40 dB
LW (at 254 kHz)	40 dB
IF rejection	
MW (at 999 kHz)	60 dB
LW (at 254 kHz)	60 dB

■ GENERAL

Output voltage	0.3V (0.6V,IHF)
Power consumption	9W
Power supply	
For Great Britain	AC 50 Hz/60 Hz,240V
For continental Europe	AC 50 Hz/60 Hz,220V
For others	AC 50 Hz/60 Hz,110V/127V/220V/240V
Dimensions (W x H x D)	360 x 64.5 x 288 mm
	(14-3/16″ x 2-17/32″ x 11-11/32″)
Weight	2.0 kg (4.4 lb.)

Notes:
Specifications are subject to change without notice.
Weight and dimensions are approximate.

Technics

Matsushita Electric Industrial Co., Ltd.
Central P.O. Box 288, Osaka 530-91, Japan

ST-X933L

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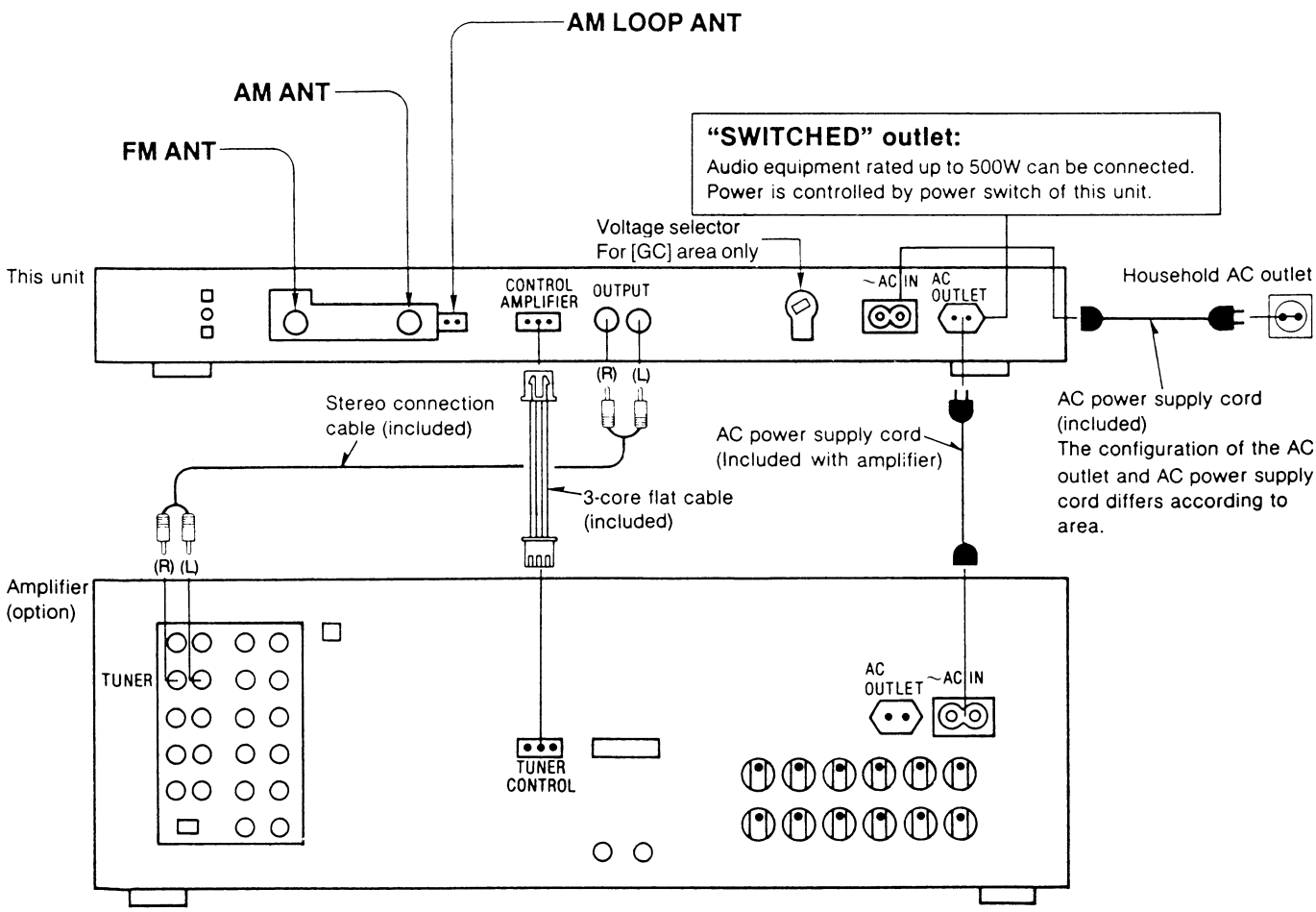
■ ACCESSORIES

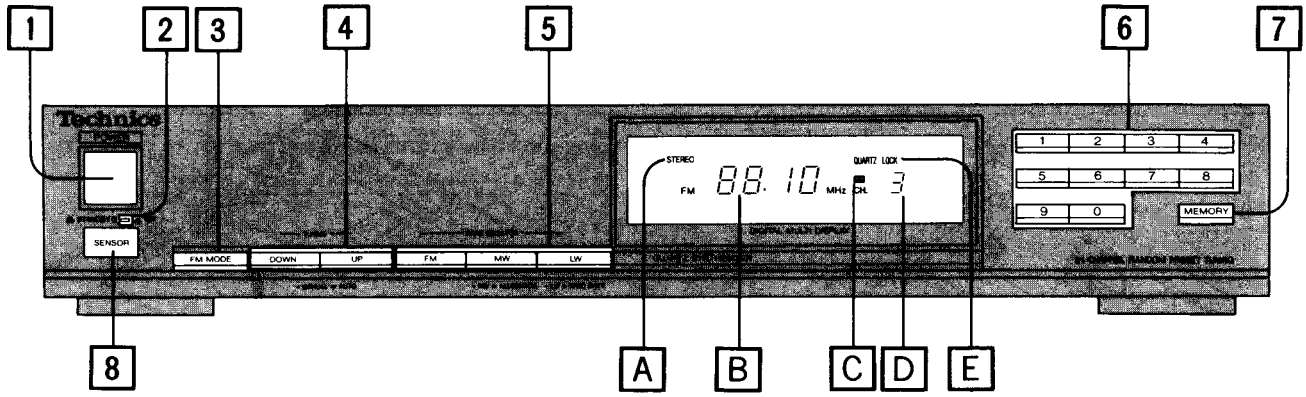
- Stereo connection cable (SJPK2203-1) 1
- FM indoor antenna 1
  For [GC, GN] areas only (SSA269M)
  For others areas (SSA270M)
- AM loop antenna (SPB1162T) 1
- AM antenna holders (SMA233-1M) 1
  (SMA231M) 1
- Screws (XTB3+10AFZ) 2
- 3-core flat cable (SWKTX930E) 1
- AC plug adaptor (RJP9215 for [GC] area only) 1
- AC power supply cord 1
  For [GN] area only (SJA173)
  For [GC] area only (RJA0004)
  For [E] area only (SFDAC05E03)
  For [EB] area only (SJA193)
- Remote-control transmitter 1
  For [GN] area only (EUR64776)
  For other areas (EUR64754)
- Attachment plug (SJP9009 for [EB] area only) 1
- Batteries (R03) 2

■ CONNECTIONS



■ LOCATION OF CONTROLS

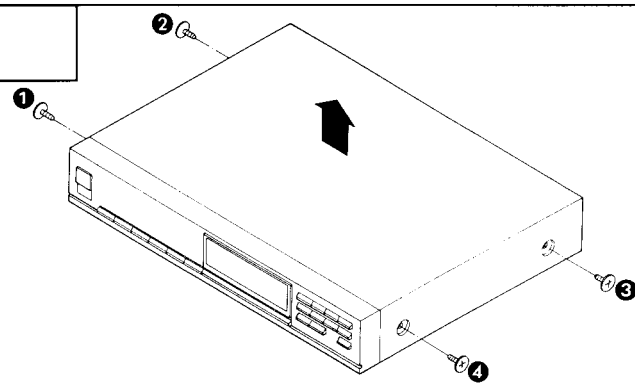
Tuner section



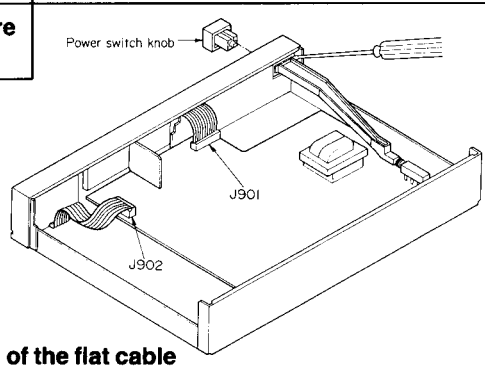
1. Power "STANDBY ⏻/ON" switch (POWER "STANDBY ⏻/ON")
2. "STANDBY ⏻" indicator
3. FM mode selector (FM MODE)
4. Tuning buttons (TUNING)
5. Band selectors (BAND SELECTOR)
6. Preset-tuning buttons (1–0) (24 CHANNEL RANDOM PRESET TUNING)
7. Memory button (MEMORY)
8. Remote-control signal receptor (SENSOR)
A. FM stereo indicator (STEREO)
B. Digital frequency display
C. Memory indicator (M)
D. Channel display
E. Quartz-lock indicator (QUARTZ LOCK)

■ DISASSEMBLY INSTRUCTIONS

Ref. No. 1	Removal of the cabinet
Procedure 1	•Remove the 4 screws (❶~❹).

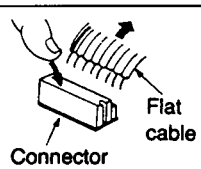


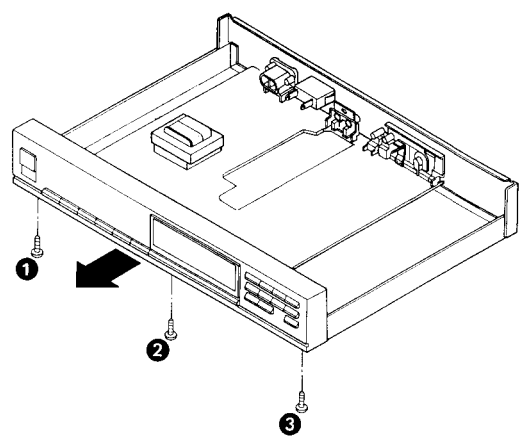
Ref. No. 2	Removal of the front panel
Procedure 1→2	1. Remove the power switch knob by pushing it from behind the front panel. 2. Remove the flat cable (J901, J902). 3. Remove the 3 screws (❶~❸). 4. Remove the front panel in the direction of the arrow.



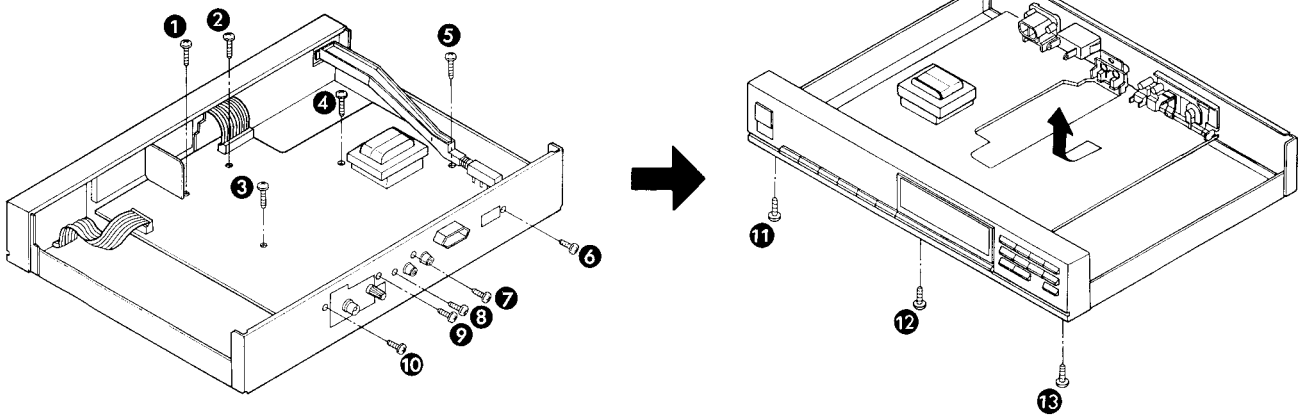
Removal of the flat cable

Pull out the flat cable while pressing the connector

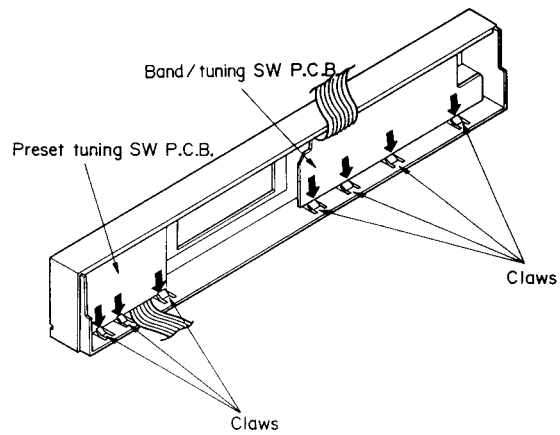




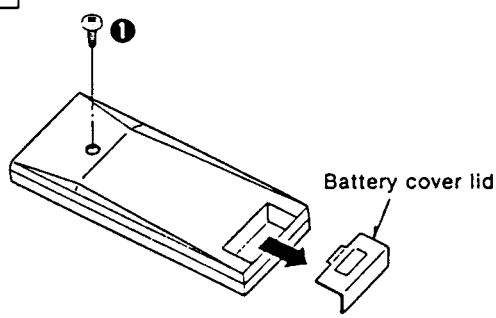
Ref. No. 3	**Removal of the main P.C.B.**
Procedure 1→3	1. Remove the 10 screws (❶~❿). 2. Remove the 3 screws (⓫~⓭). 3. Slightly pull the front panel toward you and remove the main P.C.B.

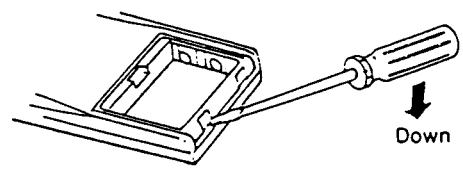


Ref. No. 4	**Removal of the preset tuning SW P.C.B. and band/tuning SW P.C.B.**
Procedure 1→2→4	1. Push the 3 claws and remove the preset tuning SW P.C.B. 2. Push the 4 claws and band/tuning SW P.C.B.



Ref. No. 5	**Removal of the remote control**
Procedure 5	1. Remove the battery cover lid. 2. Remove the one screw (❶). 3. Insert a screwdriver blade between the upper and lower covers inside the battery compartment and them slowly loosen the bottom cover.





■ MEASUREMENTS AND ADJUSTMENTS

FM ADJUSTMENT

Control positions and equipment used

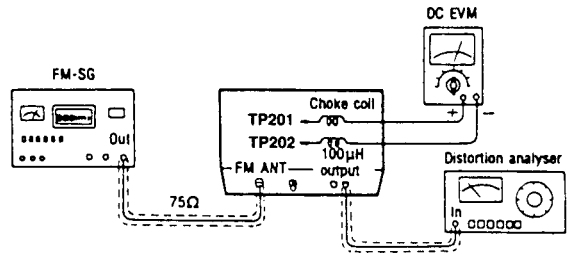
- FM signal generator(FM-SG)
- Stereo modulator
- Distortion analyser
- DC electronic voltmeter(EVM)
- Frequency counter
- Choke coil(100μH)
- Resistor(100kΩ)

Note: For Z202(AM-IFT), Z251(AM ANT and OSC coil), L321 (L.P.F) and L 322(L.P.F), they are supplied as adjusted parts. So, do not turn the cores of the parts.

FM MONO DISTORTION ADJUSTMENT

1.Test equipment connection is shown in figure.
2.Set the unit to "**FM**" mode.
3.Set the radio frequency display and signal generator to **100.10MHz**.
4.Adjust the core of **T201** so that the voltage measured in signal mode is **0mV(0±20mV)** in 300mV range.
5.Adjust **T202** so that the distortion factor of L-CH is minimized.
6.Repeat steps 4 and 5.
7.Make sure that the distortion factors of L-CH and R-CH are nearly the same and minimum.
Note: The adjusting screwdriver used should be made of resin.

FM SIGNAL GENERATOR CONDITION
Modulation 100%
Modulation frequency 1kHz
Output level.....66dB



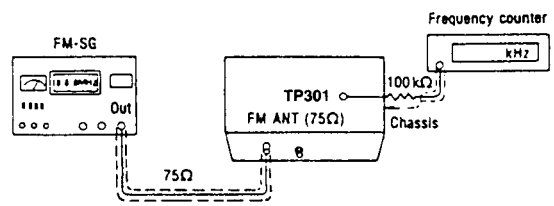
MPX VCO ADJUSTMENT

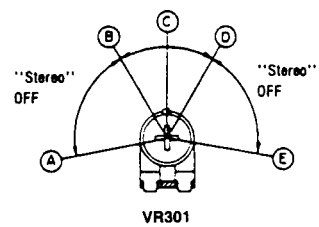
1.Test equipment connection is shown in figure.
2.Set the unit to "**on/auto**" position.
3.Set the radio frequency display and signal genarator to **100.10MHz**.
4.Adjust **VR301** for **19kHz±30Hz** on frequency counter reading.

USING ALTERNATE SYSTEM

1.Receive the stereo broadcast.
2.Adjust **VR301** until stereo indicator lights up. Fix the arm of **VR301** as shown in figure.

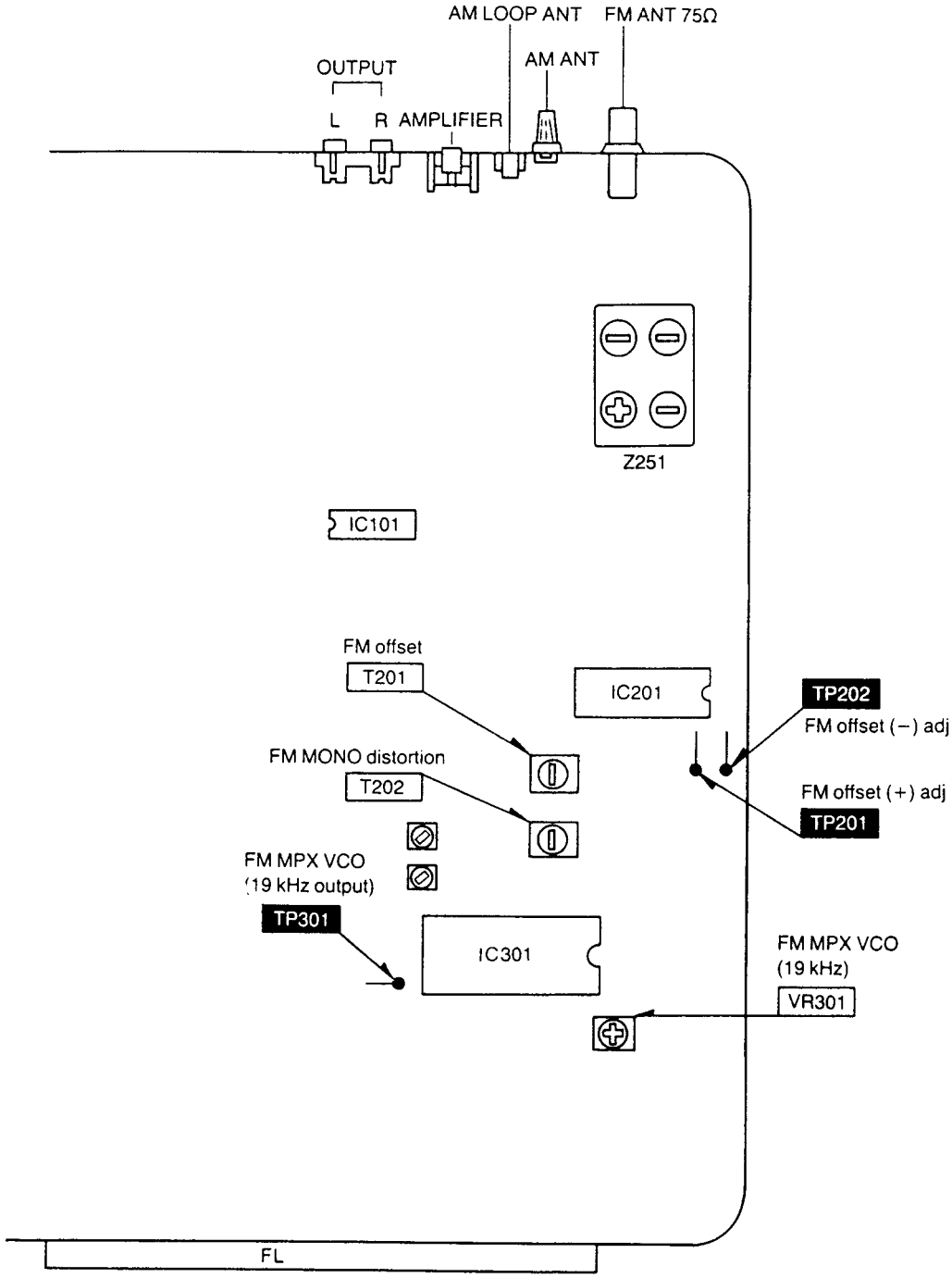
FM SIGNAL GENERATOR CONDITION
Modulation 100%
Modulation frequency 0kHz
Output level.....66dB



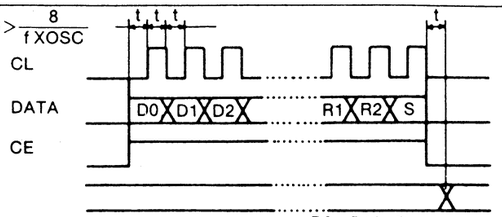


Ⓐ−Ⓑ,
Ⓓ−Ⓔ..... "Stereo" OFF position
Ⓑ−Ⓓ..... "Stereo" ON position (Indicator lighting)
Ⓒ..... Adjust point of pilot circuit

•ADJUSTMENT POINTS



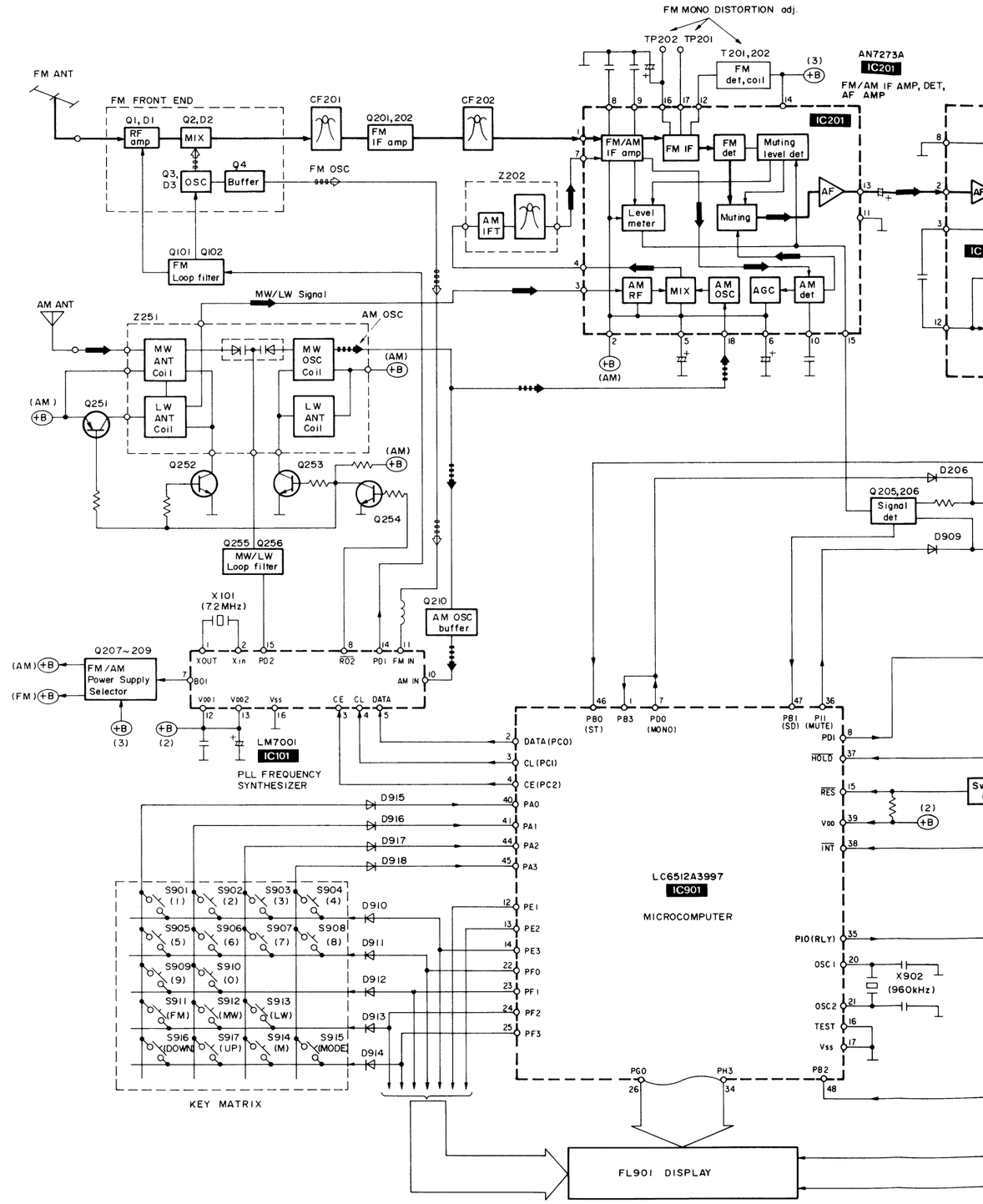
■ FUNCTIONS OF IC TERMINALS (IC901: LC6512A3997)

PIN NO.	IN/OUT	MARK	DESCRIPTION OF TERMINAL
1	INPUT	PB3	Computer drive terminal.
2	OUTPUT	DATA	Data output t > 8/fXOSC  f XOSC: Crystal OSC D0~D13: Divided frequency data R0~R2: Reference frequency data
3		CL	
4		CE	
5	—	PC3	Not used in this unit.
6	—	NC	Not used in this unit.
7	OUTPUT	PD0	Auto/mono changeover terminal. (auto → 0V, mono → 5V)
8	OUTPUT	PD1	Computer drive terminal.
9	—	PD2	Not used in this unit.
10		PD3	
11		PE0	
12 ~ 14 • 22 ~ 25	OUTPUT	PE1 ~ PE3 • PF0 ~ PF3	Digital signal terminal for display. Terminal for key return signal to external key matrix.
15	INPUT	$\overline{RES}$	Reset terminal.
16	—	TEST	Ground terminal.
17		V_{SS}	
18	—	NC	Not used in this unit.
19			
20	INPUT	OSC1	Connecting terminal for crystal oscillator.
21	OUTPUT	OSC2	
26 ~ 29 • 31 ~ 34	OUTPUT	PG0 ~ PG3 • PH0 ~ PH3	Segment signal terminal for display.
30	—	NC	Not used in this unit.
35	OUTPUT	P10	Control signal terminal for relay (RLY701).
36	OUTPUT	P11	Muting signal terminal. (Muting → High level)
37	INPUT	$\overline{HOLD}$	Terminal for power failure detection.
38	INPUT	$\overline{INT}$	Terminal for remote control cord.
39	INPUT	V_{DD}	Power supply terminal of device. Voltage of 5V is supplied during operation of device.
40	INPUT	PA0 ~ PA3	Terminal for key return signal to external key matrix.
41			
44			
45			
42 • 43	—	NC	Not used in this unit.
46	INPUT	PB0 ~ PB2	Stereo signal terminal.
47			SD signal terminal.
48			Tuner select terminal. (Ground connection)

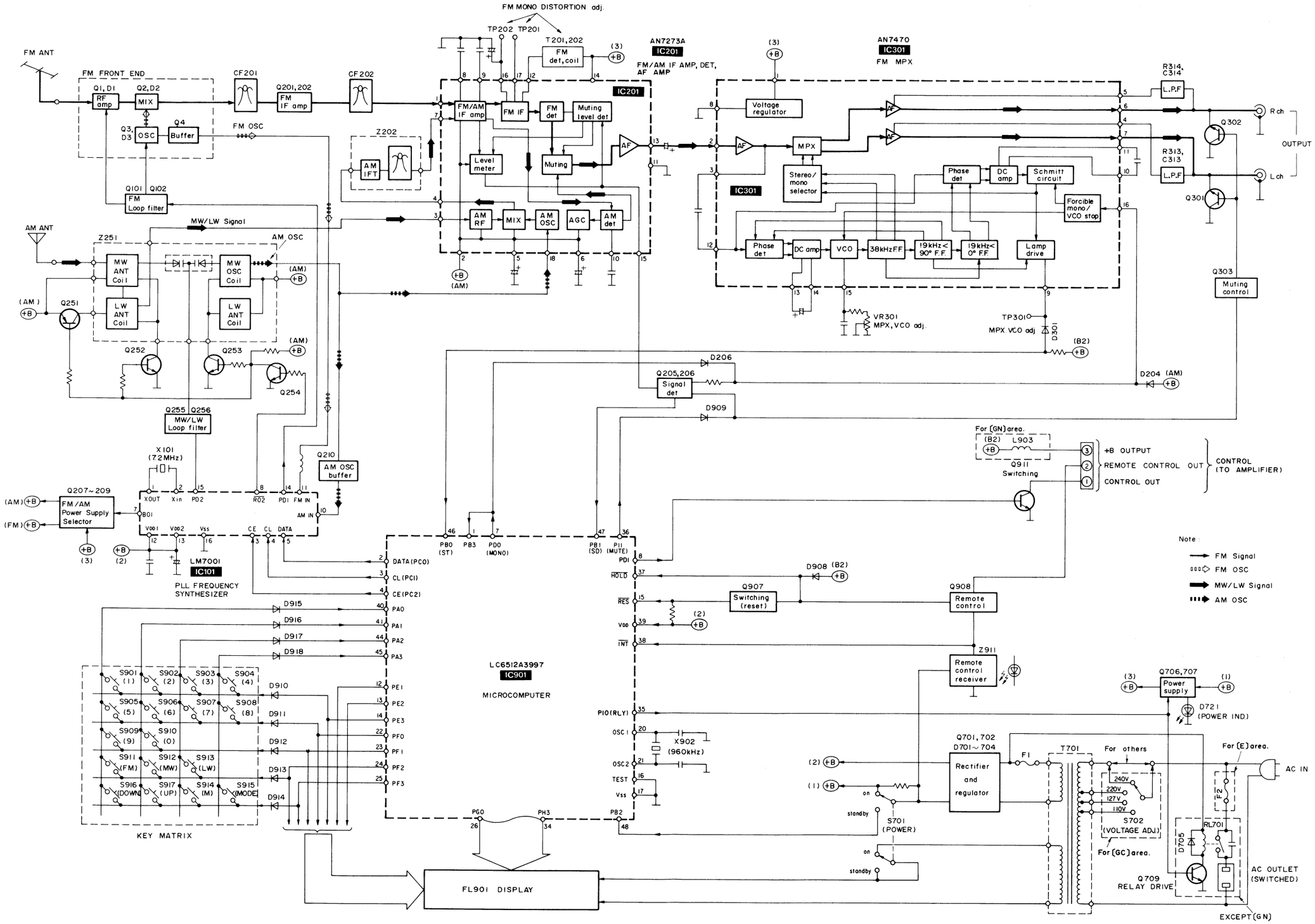
[KEY MATRIX]

Pin No.	45	44	41	40
14	CH4	CH3	CH2	CH1
22	CH8	CH7	CH6	CH5
23	—	—	CH0	CH9
24	—	—	AM	FM
25	MODE	MEMORY	UP	DOWN

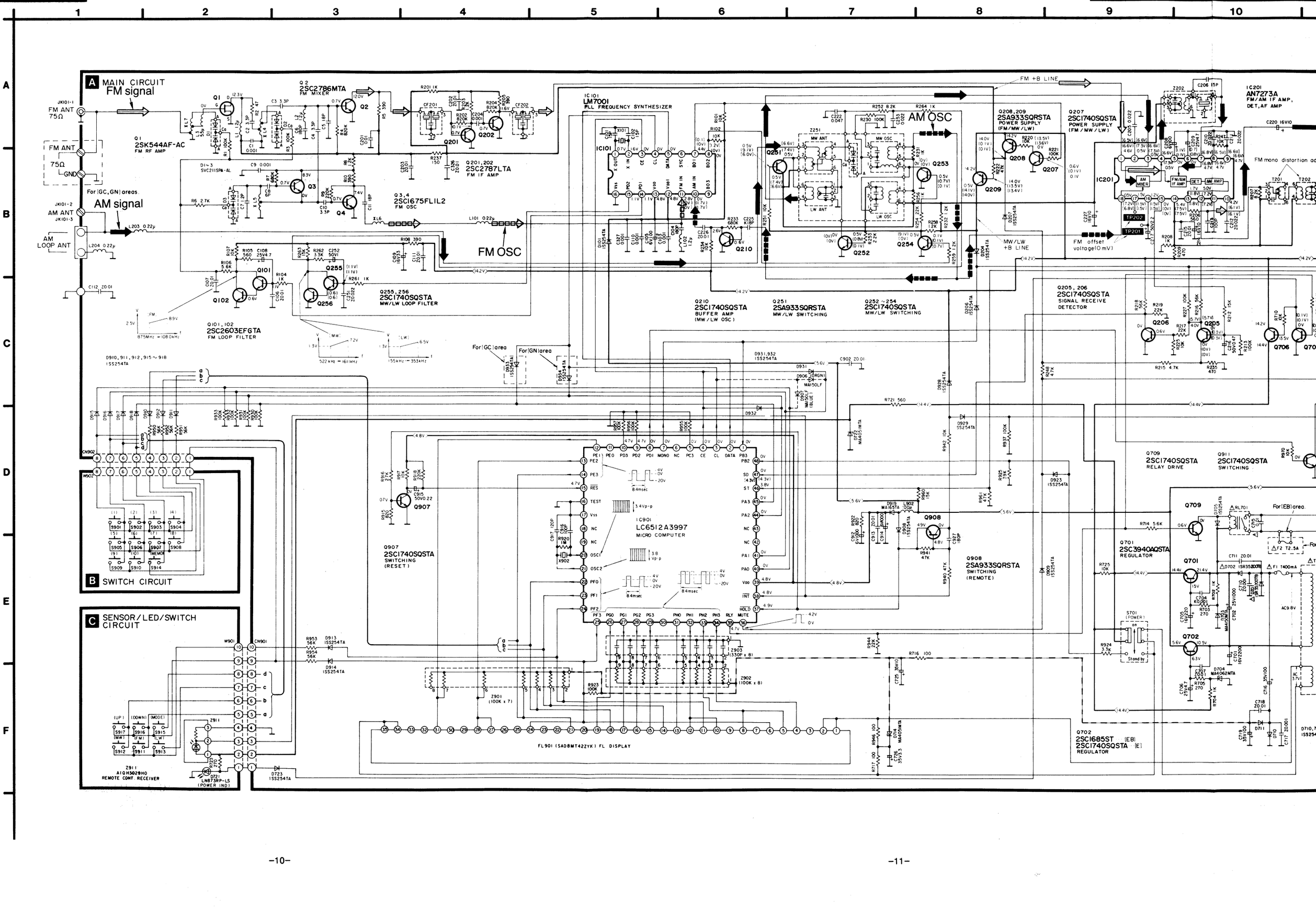
■ BLOCK DIAGRAM



■ BLOCK DIAGRAM



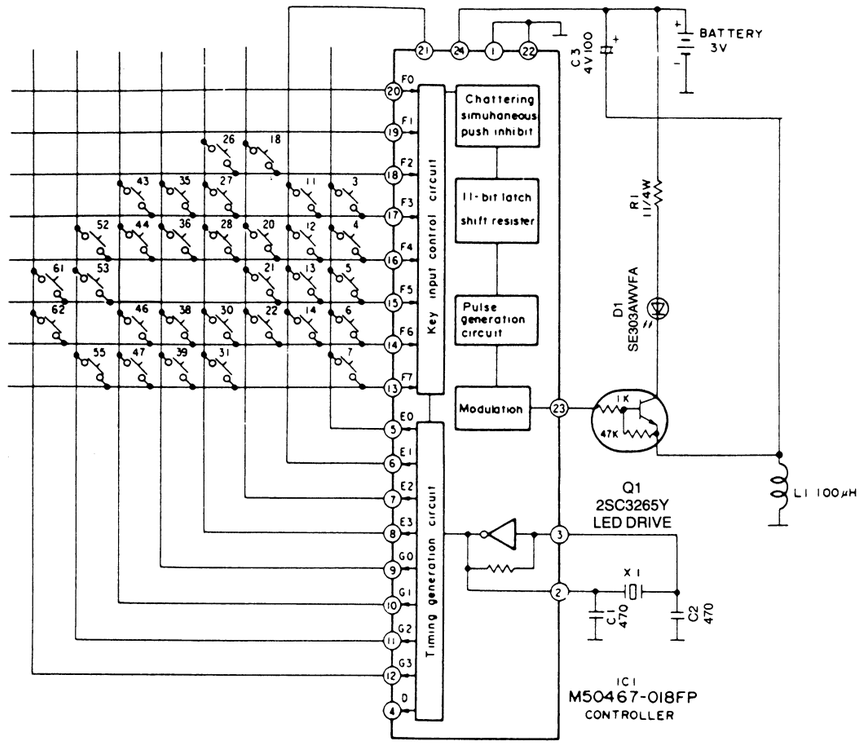
ST-X933L ST-X933L



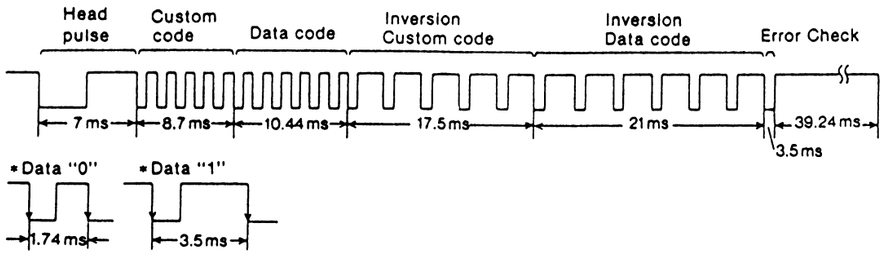
IC101
LM7001
PLL FREQUENCY SYNTHESIZER
IC901
LC6512A3997
MICRO COMPUTER
FL901 (SAD8MT42ZYK) FL DISPLAY
AM OSC
FM +B LINE
MW/LW +B LINE
FM offset voltage(0mV)
IC201
AN7273A
FM/AM IF AMP, DET, AF AMP
FM mono distortion adj
IC301
AN7470
FM MPX
MPX VCO adj
Q301, 302
2SC1740SQSTA
MUTING
AF signal
JK301
L ch
R ch
OUTPUT
Q303
2SA933SQRSTA
MUTING CONT.
Q210
2SC1740SQSTA
BUFFER AMP
(MW/LW OSC)
Q251
2SA933SQRSTA
MW/LW SWITCHING
Q252 ~254
2SC1740SQSTA
MW/LW SWITCHING
Q208,209
2SA933SQRSTA
POWER SUPPLY
(FM/MW/LW)
Q207
2SC1740SQSTA
POWER SUPPLY
(FM/MW/LW)
Q205, 206
2SC1740SQSTA
SIGNAL RECEIVE DETECTOR
Q706
2SA933SQRSTA
POWER SUPPLY
Q707
2SC1740SQSTA
POWER SUPPLY
Q709
2SC1740SQSTA
RELAY DRIVE
Q911
2SC1740SQSTA
SWITCHING
Q908
2SA933SQRSTA
SWITCHING
(REMOTE)
Q701
2SC3940AQSTA
REGULATOR
Q702
2SC1685ST (EB)
2SC1740SQSTA (E)
REGULATOR
JK901
CONTROL OUT
REMOTO CONTROL OUT
+B OUT
CONTROL
(To AMPLIFIER)
AC 240V (EB)
AC 220V (E)
(50/60Hz)
AC OUTLET
(SWITCHED)
S701 (POWER)
Stand by
For(EB)area.
For(E)area.
For(GN)area.
Except(GN)area.
Power Source For (GC,GN) areas.
AC240V(GN)
AC110 / 127 / 220 / 240V (GC)
(50/60Hz)
For(GC)area.

•Remote control unit

Note: Key No. 7 is for EUR64754 only.



• Remote control data code



Key No.	Function	Custom code	Data code	Key No.	Function	Custom code	Data code
3	Auto rec mute	01001	000111	30	Tuner 8	01001	010111
4	Deck play ◄	01001	001001	31	Tuner 1	01001	010000
5	Vol. up	01001	100100	35	CD • skip/search	01100	000010
6	Tuner 5	01001	010100	36	Pause	01001	000110
7	Power ON/OFF	01001	100000	38	Tuner 9	01001	011000
11	CD play/pause	01100	001010	39	Tuner 2	01001	010001
12	Deck play ►	01001	001010	43	CD • skip/search	01100	000011
13	Vol. Down	01001	100101	44	Deck stop	01001	000000
14	Tuner 6	01001	010101	46	Tuner 0	01001	011001
18	Turntable start	01001	001100	47	Tuner 3	01001	010010
20	Deck ◄◄	01001	000010	52	Rec	01001	001000
21	Muting	01001	100111	53	Deck A/B	01001	000100
22	Tuner 7	01001	010110	55	Tuner 4	01001	010011
26	Turntable stop	01001	001101	61	EQ • OF/FLAT	01001	110000
27	CD stop	01100	000000	62	EQ Preset	01001	110010
28	Deck ►►	01001	000011				

■ SCHEMATIC DIAGRAM (Parts list on pages 18~21)

(This schematic diagram may be modified at any time with the development of new technology.)

Note 1:

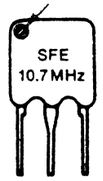
- •S701 : Power source switch in "on" position.
- •S702 : Voltage selector switch in "240 V" position. (110 V◄►127 V◄►220 V◄►240 V) For (GC) area only
- • S901~S910 : Preset tuning switch. [S901: CH1, S902: CH2, S903: CH3, S904: CH4, S905: CH5, S906: CH6, S907: CH7, S908: CH8, S909: CH9, S910: CH0]
- • S911 : FM select switch.
- • S912 : MW select switch.
- • S913 : LW select switch.
- • S914 : Memory set switch.
- • S915 : FM mode switch.
- • S916 : Tuning (down) switch. [down: tuning to lower frequency]
- • S917 : Tuning (up) switch. [up: tuning to higher frequency]
- Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
  - *Figures in ( ) stand for DC voltage in MW signal reception mode.
  - *Figures in { } stand for DC voltage in LW signal reception mode.
- Positive voltage lines / AF signal lines / FM OSC / FM signal / AM OSC / AM signal
- Important safety notice
  Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

Note 2:

• Use of ceramic filters in pairs

The ceramic filters (CF201, CF202) for FM-IF circuit are available in three ranks. For this circuit, be sure to use the ceramics of the same rank in a pair.
At repairing and replacement, pay close attention to the diodes (D906, D907) for use as different diodes must be used depending on each rank of the ceramic filters.

Color marking
(Red, Black or White)



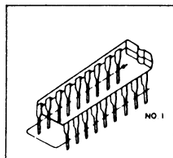
RANK (Color)	D906	D907	CENTER FREQUENCY
Orange	○	×	10.72 MHz
Red	×	×	10.70 MHz
Blue	×	○	10.67 MHz

Note: ○ mark: Diode is used.
× mark: Diode is not used.

∗ Caution!

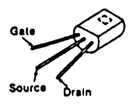
IC and LSI are sensitive to static electricity.
Secondary trouble can be prevented by taking care during repair.
∗ Cover the parts boxes made of plastics with aluminum coil.
∗ Ground the soldering iron.
∗ Put a conductive mat on the work table.
∗ Do not touch the legs of IC or LSI with the fingers directly.

■ TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES

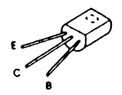


AN7470	16 Pin
LM7001	16 Pin
AN7273A	18 Pin

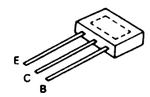
2SK544F-AC

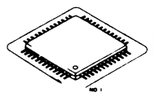


2SC3940A-Q
2SC2787L
2SC2786M
2SC1675FLIL2
2SC1685ST



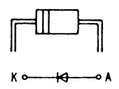
2SC2603EFG
2SC1740SQ
2SA933SQR



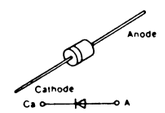


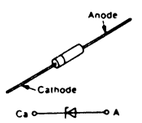
LC6512A3997	48 pin

ISR35200



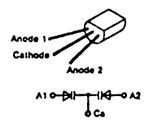
MA165, 1SS254





MA4051M,
MA4062M,
MA4150M

SVC211SPA-AL



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CENTER FREQUENCY
10.72 MHz
10.70 MHz
10.67 MHz

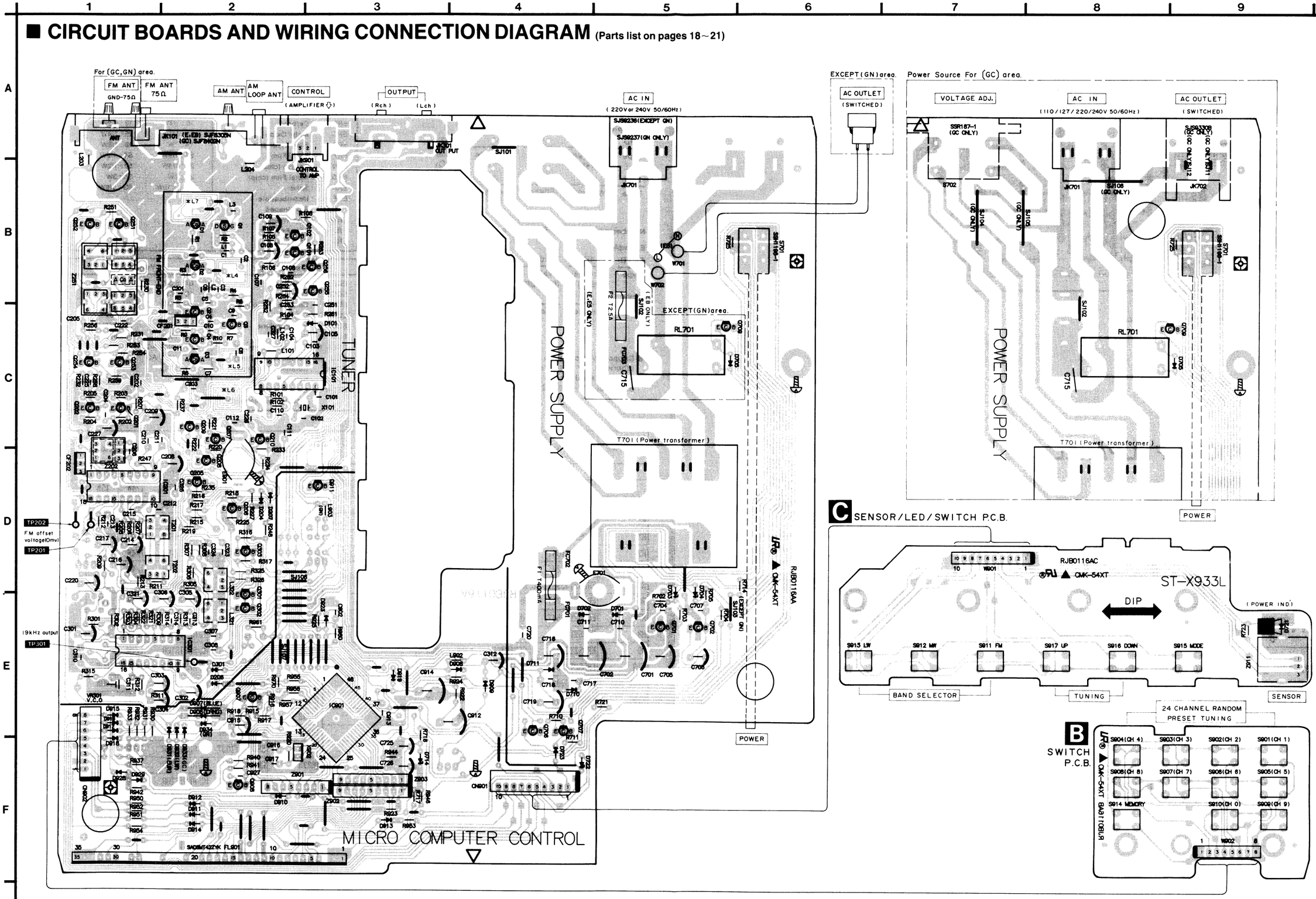
ring repair.
um coil.

irectly.

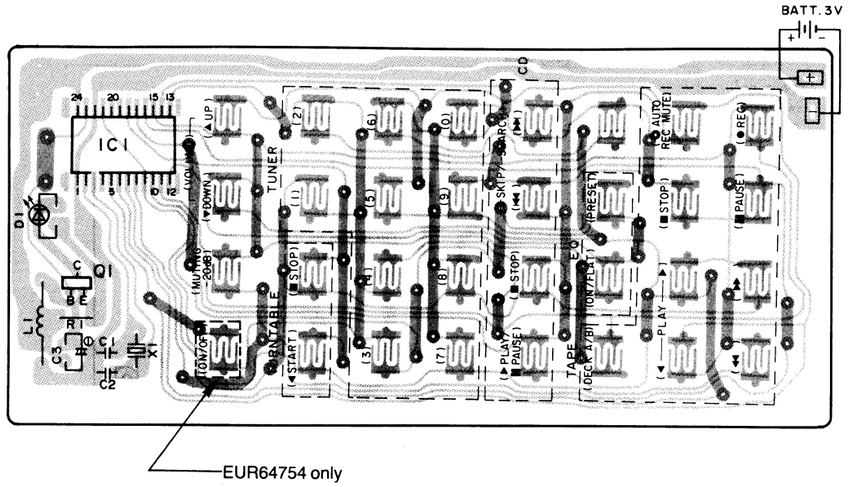
C2603EFG
C1740SQ
A933SQR

A4051M,
A4062M,
A4150M

■ CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM (Parts list on pages 18~21)

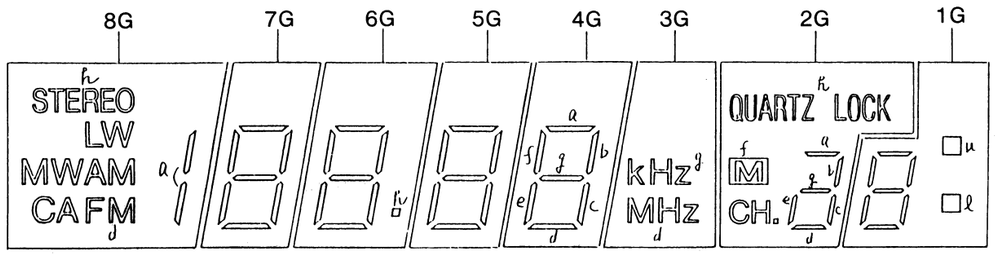


●Remote control unit



■ DESCRIPTION OF FL PANEL

●GRID ASSIGNMENT



Note: The grid of 3G and 8G are used for external connection.

●PIN CONNECTION

PIN NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
CONNECTION	F1	F1	NP	h	f	8G	AM	MW	CA	LW	7G	c	a	6G	e	d	g	5G	b	NP	4G	NP	NP	3G	NP	NP	CH	2G	NP	u	1G	ℓ	NP	F2	F2

■ RESISTORS AND CAPACITORS

Notes : * Important safety notice :
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
* Bracketed indications in Remarks columns specify the area. (Refer to the first page for area.)
Parts without these indications can be used for all areas.

Numbering System For Resistors

Example:

ERD	25	F	J	102
Type	Wattage (1/4W)	Shape	Tolerance	Value (1KΩ)
ERX	2	AN	J	471
Type	Wattage (2W)	Shape	Tolerance	Value (470Ω)

Numbering System For Capacitors

Example:

ECKD	1H	102	Z	F
Type	Voltage (50V)	Value (0.001μF)	Tolerance	Unique
ECEA	50	M		330
Type	Voltage (50V)	Characteristics		Value (33μF)

- Capacity values are in microfarads (μF) unless specified otherwise, P = Pico-farads (pF) F = Farads (F).
- Resistance values are in ohms (Ω), unless specified otherwise, 1K = 1,000Ω, 1M = 1,000kΩ

Resistor Type		Wattage		Tolerance
ERD	: Carbon	10 : 1/8W	12 : 1/2W	J : ±5%
ERG	: Metal Oxide	14 : 1/4W	25 : 1/4W	F : ±1%
ERQ	: Fuse Type Metal	1A : 1W	18 : 1/8W	G : ±2%
ERX	: Metal Film	S2 : 1/4W	S1 : 1/2W	J : ±5%
ERD L	: Carbon (chip)	2F : 1/4W	50 : 1/2W	K : ±10%
ERO K	: Metal Film (chip)	2A : 2W	3A : 3W	M : ±20%
ERC	: Solid	6G : 1/10W	8G : 1/8W	
ERF	: Incombustible Box-Shaped			
ERM	: Wire-Wound			
RRJ	: Chip Resistor			
ERJ	: Chip Resistor			

Capacitor Type		Voltage		Tolerance
ECE	: Electrolytic	0J : 6.3V	1A : 10V	K : ±10%
ECCD	: Ceramic	1C : 16V	1E : 25V	M : ±20%
ECKD	: Ceramic Capacitor	1H : 50V	1V : 35V	Z : +80 % −20
ECQM	: Polyester	50 : 50V	05 : 50V	J : ±5%
ECQP	: Polypropylene	2H : 500V	2A : 100V	G : ±2%
ECG	: Ceramic	1 : 100V	1J : 63V	F : ±1%
ECEA N	: Non Polar Electrolytic	KC : 400V AC		C : ±0.25pF
QCU	: Ceramic (Chip Type)	KC : 125V AC (UL)		D : ±0.5pF
ECUX	: Ceramic (Chip Type)			
ECF	: Semiconductor			
EECW	: Liquid electrolyte double layer capacitor			

Ref. No.	Part No.	Part Name & Description	Remarks
		RESISTORS	
R1	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R2	ERDS2TJ470T	C. RESISTOR 1/4W 47	
R3	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R4	ERDS2TJ824T	C. RESISTOR 1/4W 820K	
R5	ERDS2TJ391T	C. RESISTOR 1/4W 390	
R6	ERDS2TJ272T	C. RESISTOR 1/4W 2.7K	
R7	ERDS2TJ684T	C. RESISTOR 1/4W 680K	
R8	ERDS2TJ122T	C. RESISTOR 1/4W 1.2K	
R9	ERDS2TJ224T	C. RESISTOR 1/4W 220K	
R10	ERDS2TJ391T	C. RESISTOR 1/4W 390	
R101, 102	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R104	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R105	ERDS2TJ561T	C. RESISTOR 1/4W 560	
R106	ERDS2TJ562T	C. RESISTOR 1/4W 5.6K	
R107	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R108	ERDS2TJ391T	C. RESISTOR 1/4W 390	
R201	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R202	ERDS2TJ824T	C. RESISTOR 1/4W 820K	
R203	ERDS2TJ122T	C. RESISTOR 1/4W 1.2K	
R204	ERDS2TJ824T	C. RESISTOR 1/4W 820K	
R205	ERDS2TJ391T	C. RESISTOR 1/4W 390	
R206	ERDS2TJ561T	C. RESISTOR 1/4W 560	
R207	ERDS2TJ822T	C. RESISTOR 1/4W 8.2K	
R208	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R209	ERDS2TJ471T	C. RESISTOR 1/4W 470	

Ref. No.	Part No.	Part Name & Description	Remarks
R211	ERDS2TJ222T	C. RESISTOR 1/4W 2.2K	
R212	ERDS2TJ153T	C. RESISTOR 1/4W 15K	
R213	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R215	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R216	ERDS2TJ563T	C. RESISTOR 1/4W 56K	
R217	ERDS2TJ223T	C. RESISTOR 1/4W 22K	
R218	ERDS2TJ563T	C. RESISTOR 1/4W 56K	
R219	ERDS2TJ223T	C. RESISTOR 1/4W 22K	
R220	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R221	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R222	ERDS2TJ473T	C. RESISTOR 1/4W 47K	
R225	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R227	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R230	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R231	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R232	ERDS2TJ122T	C. RESISTOR 1/4W 1.2K	
R233	ERDS2TJ684T	C. RESISTOR 1/4W 680K	
R234	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R235	ERDS2TJ471T	C. RESISTOR 1/4W 470	
R237	ERDS2TJ151T	C. RESISTOR 1/4W 150	
R247	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R248	ERDS2TJ472T	C. RESISTOR 1/4W 4.7K	
R251	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R252	ERDS2TJ822T	C. RESISTOR 1/4W 8.2K	
R253	ERDS2TJ222T	C. RESISTOR 1/4W 2.2K	
R254	ERDS2TJ223T	C. RESISTOR 1/4W 22K	
R256	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R258, 259	ERDS2TJ122T	C. RESISTOR 1/4W 1.2K	

Ref. No.	Part No.
R261	ERDS2TJ102
R262	ERDS2TJ33
R263	ERDS2TJ15
R264	ERDS2TJ102
R301	ERDS2TJ39
R302	ERDS2TJ15
R303, 304	ERDS2TJ22
R305, 306	ERDS2TJ27
R307, 308	ERDS2TJ56
R309	ERDS2TJ22
R311	ERDS2TJ102
R312	ERDS2TJ15
R313, 314	ERDS2TJ47
R315	ERDS2TJ103
R316	ERDS2TJ102
R317	ERDS2TJ47
R321, 322	ERDS2TJ33
R325, 326	ERDS2TJ102
R702	ERDS2TJ102
R703	ERDS2TJ27
R704	ERDS2TJ102
R705	ERDS2TJ27
R710	ERDS2TJ103
R711	ERDS2TJ22
R714	ERDS2TJ56
R716, 717	ERDS2TJ101
R721	ERDS2TJ56
R723	ERDS2TJ27
R725	ERDS2TJ103
R915	ERDS2TJ82
R916	ERDS2TJ27
R917	ERDS2TJ103
R918	ERDS2TJ22
R920	ERDS2TJ10
R922	ERDS2TJ82
R923	ERDS2TJ104
R924	ERDS2TJ33
R925	ERDS2TJ39
R930~933	ERDS2TJ104
R937	ERDS2TJ104
R940, 941	ERDS2TJ47
R942	ERDS2TJ103
R944	ERDS2TJ22
R946	ERDS2TJ101
R950~954	ERDS2TJ56
R955~957	ERDS2TJ104
R960	ERDS2TJ15
R961	ERDS2TJ47
R970	ERDS2TJ103

Ref. No.	Part No.	Part Name & Description	Remarks
R261	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R262	ERDS2TJ332T	C. RESISTOR 1/4W 3.3K	
R263	ERDS2TJ153T	C. RESISTOR 1/4W 15K	
R264	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R301	ERDS2TJ393T	C. RESISTOR 1/4W 39K	
R302	ERDS2TJ151T	C. RESISTOR 1/4W 150	
R303, 304	ERDS2TJ223T	C. RESISTOR 1/4W 22K	
R305, 306	ERDS2TJ272T	C. RESISTOR 1/4W 2.7K	
R307, 308	ERDS2TJ562T	C. RESISTOR 1/4W 5.6K	
R309	ERDS2TJ224T	C. RESISTOR 1/4W 220K	
R311	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R312	ERDS2TJ153T	C. RESISTOR 1/4W 15K	
R313, 314	ERDS2TJ473T	C. RESISTOR 1/4W 47K	
R315	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R316	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R317	ERDS2TJ473T	C. RESISTOR 1/4W 47K	
R321, 322	ERDS2TJ333T	C. RESISTOR 1/4W 33K	
R325, 326	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R702	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R703	ERDS2TJ271T	C. RESISTOR 1/4W 270	
R704	ERDS2TJ102T	C. RESISTOR 1/4W 1K	
R705	ERDS2TJ271T	C. RESISTOR 1/4W 270	
R710	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R711	ERDS2TJ223T	C. RESISTOR 1/4W 22K	
R714	ERDS2TJ562T	C. RESISTOR 1/4W 5.6K	<E, EB, GC>
R716, 717	ERDS2TJ101T	C. RESISTOR 1/4W 100	
R721	ERDS2TJ561T	C. RESISTOR 1/4W 560	
R723	ERDS2TJ271T	C. RESISTOR 1/4W 270	
R725	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R915	ERDS2TJ821T	C. RESISTOR 1/4W 820	
R916	ERDS2TJ272T	C. RESISTOR 1/4W 2.7K	
R917	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R918	ERDS2TJ224T	C. RESISTOR 1/4W 220K	
R920	ERDS2TJ105T	C. RESISTOR 1/4W 1M	
R922	ERDS2TJ821T	C. RESISTOR 1/4W 820	
R923	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R924	ERDS2TJ332T	C. RESISTOR 1/4W 3.3K	
R925	ERDS2TJ393T	C. RESISTOR 1/4W 39K	
R930~933	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R937	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R940, 941	ERDS2TJ473T	C. RESISTOR 1/4W 47K	
R942	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
R944	ERDS2TJ223T	C. RESISTOR 1/4W 22K	
R946	ERDS2TJ101T	C. RESISTOR 1/4W 100	
R950~954	ERDS2TJ563T	C. RESISTOR 1/4W 56K	
R955~957	ERDS2TJ104T	C. RESISTOR 1/4W 100K	
R960	ERDS2TJ153T	C. RESISTOR 1/4W 15K	
R961	ERDS2TJ473T	C. RESISTOR 1/4W 47K	
R970	ERDS2TJ103T	C. RESISTOR 1/4W 10K	
		CAPACITORS	

Ref. No.	Part No.	Part Name & Description	Remarks
C1	ECBT1H102KB5	C. CAPACITOR 50V 0.001U	
C2~4	RCBS1H3R3KCY	C. CAPACITOR 50V 3.3P	
C5	RCBS1H180JCY	C. CAPACITOR 50V 18P	
C6	RCBS1H181KBY	C. CAPACITOR 50V 180P	
C7	RCBS1H1R2MCY	C. CAPACITOR 50V 1.2P	
C8	ECCT1H060CC	C. CAPACITOR 50V 6P	
C9	ECBT1H102KB5	C. CAPACITOR 50V 0.001U	
C10	RCBS1H3R3KCY	C. CAPACITOR 50V 3.3P	
C11	RCBS1H180JCY	C. CAPACITOR 50V 18P	
C101, 102	RCBS1H150JCY	C. CAPACITOR 50V 15P	
C103	ECBT1H102KB5	C. CAPACITOR 50V 0.001U	
C104	RCBS1H181KBY	C. CAPACITOR 50V 180P	
C105	ECEA0JU101B	E. CAPACITOR 6.3V 100U	
C106, 107	ECKT1H103ZF	C. CAPACITOR 50V 0.01U	
C108	ECEA25M4R7RB	E. CAPACITOR 25V 4.7U	
C109	ECEA1CU330B	E. CAPACITOR 16V 33U	
C110	ECBT1H102KB5	C. CAPACITOR 50V 0.001U	
C111, 112	ECKT1H103ZF	C. CAPACITOR 50V 0.01U	
C201~203	ECKT1H103ZF	C. CAPACITOR 50V 0.01U	
C204	ECBT1H102KB5	C. CAPACITOR 50V 0.001U	
C205	ECBT1E223ZF5	C. CAPACITOR 25V 0.022U	
C206	RCBS1H150JCY	C. CAPACITOR 50V 15P	
C208	ECEA0JU101B	E. CAPACITOR 6.3V 100U	
C209	ECEA1EK4R7B	E. CAPACITOR 25V 4.7U	
C210, 211	ECKT1H223ZF	C. CAPACITOR 50V 0.022U	
C212	ECBT1E223ZF5	C. CAPACITOR 25V 0.022U	
C213	ECCT1H101K	C. CAPACITOR 50V 100P	
C214	ECEA1CK100B	E. CAPACITOR 16V 10U	
C215	ECBT1E103ZF5	C. CAPACITOR 25V 0.01U	
C216	ECEA1HKR47B	E. CAPACITOR 50V 0.47U	
C217	ECEA1HK2R2B	E. CAPACITOR 50V 2.2U	
C220	ECEA1CK100B	E. CAPACITOR 16V 10U	
C222	ECFTD473KXL	S. CAPACITOR 25V 0.047U	
C225	RCBS1H180JCY	C. CAPACITOR 50V 18P	
C226	ECKT1H103ZF	C. CAPACITOR 50V 0.01U	
C227	ECEA1CK100B	E. CAPACITOR 16V 10U	
C251	ECKT1H223ZF	C. CAPACITOR 50V 0.022U	
C252	ECEA1HK010B	E. CAPACITOR 50V 1U	
C253	ECKT1H223ZF	C. CAPACITOR 50V 0.022U	
C301	ECEA1CU101B	E. CAPACITOR 16V 100U	
C302	ECEA1HKR47B	E. CAPACITOR 50V 0.47U	
C303	ECEA1HK010B	E. CAPACITOR 50V 1U	
C304~306	ECEA1VK3R3B	E. CAPACITOR 35V 3.3U	
C307, 308	ECFTD392KXL	S. CAPACITOR 25V 0.0039U	
C310	ECFTD473KXL	S. CAPACITOR 25V 0.047U	
C311	ECQP1471JZ3	P. CAPACITOR 100V 470P	
C312	ECEA1CK100B	E. CAPACITOR 16V 10U	
C313, 314	ECBT1H102KB5	C. CAPACITOR 50V 0.001U	
C321	ECEA1CK100B	E. CAPACITOR 16V 10U	
C323, 324	ECFTD332KXL	S. CAPACITOR 25V 0.0033U	
C326	ECKT1H103ZF	C. CAPACITOR 50V 0.01U	
C327	ECBT1H102KB5	C. CAPACITOR 50V 0.001U	

Ref. No.	Part No.	Part Name & Description	Remarks
C701	ECEA1CU222E	E. CAPACITOR 16V 2200U	
C702	ECEA1EU102E	E. CAPACITOR 25V 1000U	
C704	ECBT1H102KB5	C. CAPACITOR 50V 0.001U	
C705	ECEA1CU221B	E. CAPACITOR 16V 220U	
C706	ECEA1EK4R7B	E. CAPACITOR 25V 4.7U	
C707	ECKT1H103ZF	C. CAPACITOR 50V 0.01U	
C710	ECKT2H102ZF	C. CAPACITOR 500V 0.001U	
C711	ECKT1H103ZF	C. CAPACITOR 50V 0.01U	
C715	ECKWKC103PF2	C. CAPACITOR 400V 0.01U	⚠ <E, EB, GC>
C716	ECEA1VU101B	E. CAPACITOR 35V 100U	
C717	ECKT2H102ZF	C. CAPACITOR 500V 0.001U	
C718	ECKT1H103ZF	C. CAPACITOR 50V 0.01U	

Ref. No.	Part No.	Part Name & Description	Remarks
C719	ECEA1VU101B	E. CAPACITOR 35V 100U	
C720	ECKT1H103ZF	C. CAPACITOR 50V 0.01U	
C725	ECEA1VK100B	E. CAPACITOR 35V 10U	
C726	ECEA1VK3R3B	E. CAPACITOR 35V 3.3U	
C902	ECKT1H103ZF	C. CAPACITOR 50V 0.01U	
C912	ECEA0JU102B	E. CAPACITOR 6.3V 1000U	
C913	ECKT1H103ZF	C. CAPACITOR 50V 0.01U	
C914	ECEA0JU102B	E. CAPACITOR 6.3V 1000U	
C915	ECEA1HKR22B	E. CAPACITOR 50V 0.22U	
C916	ECCT1H101K	C. CAPACITOR 50V 100P	
C917	ECCT1H121K	C. CAPACITOR 50V 120P	
C927	RCBS1H181KBY	C. CAPACITOR 50V 180P	

■ REPLACEMENT PARTS LIST

Notes: ●Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
●Bracketed indications in Remarks columns specify the area. (Refer to the first page for area.)
Parts without these indications can be used for all areas.
●Remote Control Ass'y:
Supply period for three years from termination of production.

Ref. No.	Part No.	Part Name & Description	Remarks
		INTEGRATED CIRCUITS	
IC101	LM7001	IC, PLL FREQUENCY	
IC201	AN7273A	IC, FM/AM IF AMP.	
IC301	AN7470	IC, FM MPX VCO ADJ.	
IC901	LC6512A3997	IC, MICRO COMPUTER	
		TRANSISTORS	
Q1	2SK544F-AC	TRANSISTOR	
Q2	2SC2786MTA	TRANSISTOR	
Q3, 4	2SC1675FL1L2	TRANSISTOR	
Q101, 102	2SC2603EFGTA	TRANSISTOR	
Q201, 202	2SC2787LTA	TRANSISTOR	
Q205~207	2SC1740SQSTA	TRANSISTOR	
Q208, 209	2SA933SQRSTA	TRANSISTOR	
Q210	2SC1740SQSTA	TRANSISTOR	
Q251	2SA933SQRSTA	TRANSISTOR	
Q252~256	2SC1740SQSTA	TRANSISTOR	
Q301, 302	2SC1740SQSTA	TRANSISTOR	
Q303	2SA933SQRSTA	TRANSISTOR	
Q701	2SC3940AQSTA	TRANSISTOR	
Q702	2SC1740SQSTA	TRANSISTOR	<E, GC, GN>
Q702	2SC1685	TRANSISTOR	<EB>
Q706	2SA933SQRSTA	TRANSISTOR	
Q707	2SC1740SQSTA	TRANSISTOR	
Q709	2SC1740SQSTA	TRANSISTOR	<E, EB, GC>

Ref. No.	Part No.	Part Name & Description	Remarks
Q907	2SC1740SQSTA	TRANSISTOR	
Q908	2SA933SQRSTA	TRANSISTOR	
Q911	2SC1740SQSTA	TRANSISTOR	
		DIODES	
D1~3	SVC211SPA-AL	DIODE	
D101	1SS254TA	DIODE	
D204	1SS254TA	DIODE	
D206, 207	1SS254TA	DIODE	
D301	1SS254TA	DIODE	
D701, 702	1SR35200TB	DIODE	⚠
D703	MA4150MTA	DIODE	
D704	MA4062MTA	DIODE	
D705	1SS254TA	DIODE	<E, EB, GC>
D710, 711	1SS254TA	DIODE	
D714	MA4051MTA	DIODE	
D721	LN873RP-LS	DIODE	
D722	MA4051MTA	DIODE	
D723	1SS254TA	DIODE	
D908~918	1SS254TA	DIODE	
D919	MA165TA	DIODE	
D923	1SS254TA	DIODE	
D928, 929	1SS254TA	DIODE	
D931, 932	1SS254TA	DIODE	
D933	1SS254TA	DIODE	<GC>
D934	1SS254TA	DIODE	<GN>

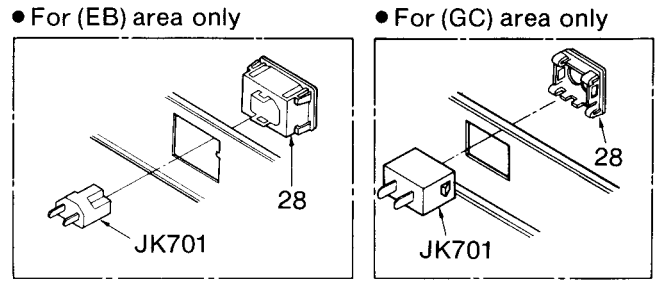
Ref. No.	Part No.	Part Name & Description	Remarks
		VARIABLE RESISTORS	
VR301	EVNDXAA00B53	V. R FM MPX VCO ADJ.	
		COMPONENT COMBINATIONS	
Z202	SLI7Z101-T	AF IF TRANSFORMER	
Z251	SLA6Z1-T	MW/LW ANTENA	
Z901	EXBF8E104J	COMPONENT COMBINATION	
Z902	EXBF9E104J	COMPONENT COMBINATION	
Z903	EXFP8331MW	COMPONENT COMBINATION	
Z911	A1QH3029H0	REMOTE SENSOR	
		COILS	
L1, 2	RLQZP1R2KT-Y	COIL	
L3	RLQY15S5-0	COIL	
L101	RLQZPR22KT-Y	COIL	
L102	RLQZP1R2KT-Y	COIL	
L203, 204	ELEPKR22MA	COIL	
L321, 322	SLM1B9-P	COIL	
L902	RLQZP101KT-Y	COIL	
L903	RLQZP101KT-Y	COIL	<GN>
		TRANSFORMERS	
T201	RL14B002-Z	TRANSFORMER	
T202	RL14B003-Z	TRANSFORMER	
T701	SLT5K259-K	POWER TRANSFORMER	⚠ <E>
T701	SLT5K260-K	POWER TRANSFORMER	⚠ <GN, EB>
T701	SLT5K261-K	POWER TRANSFORMER	⚠ <GC>
		FILTERS	
CF201	RLFETNGM02LB	CERAMIC FILTER	BLUE
CF201	RLFETNGM02LC	CERAMIC FILTER	ORANGE
CF202	RLFETNGM02LB	CERAMIC FILTER	BLUE
CF202	RLFETNGM02LC	CERAMIC FILTER	ORANGE
		OSCILLATORS	
X101	SVQ49U722T-S	OSCILLATOR	
X902	EF0A960KM4A	OSCILLATOR	
		DISPLAY TUBE	
FL901	SAD8MT42ZYK	DISPLAY TUBE	
		SWITCHES	
S701	SSH1196-1	POWER	⚠
S702	SSR187-1	VOLTAGE SELECTOR	⚠ <GC>

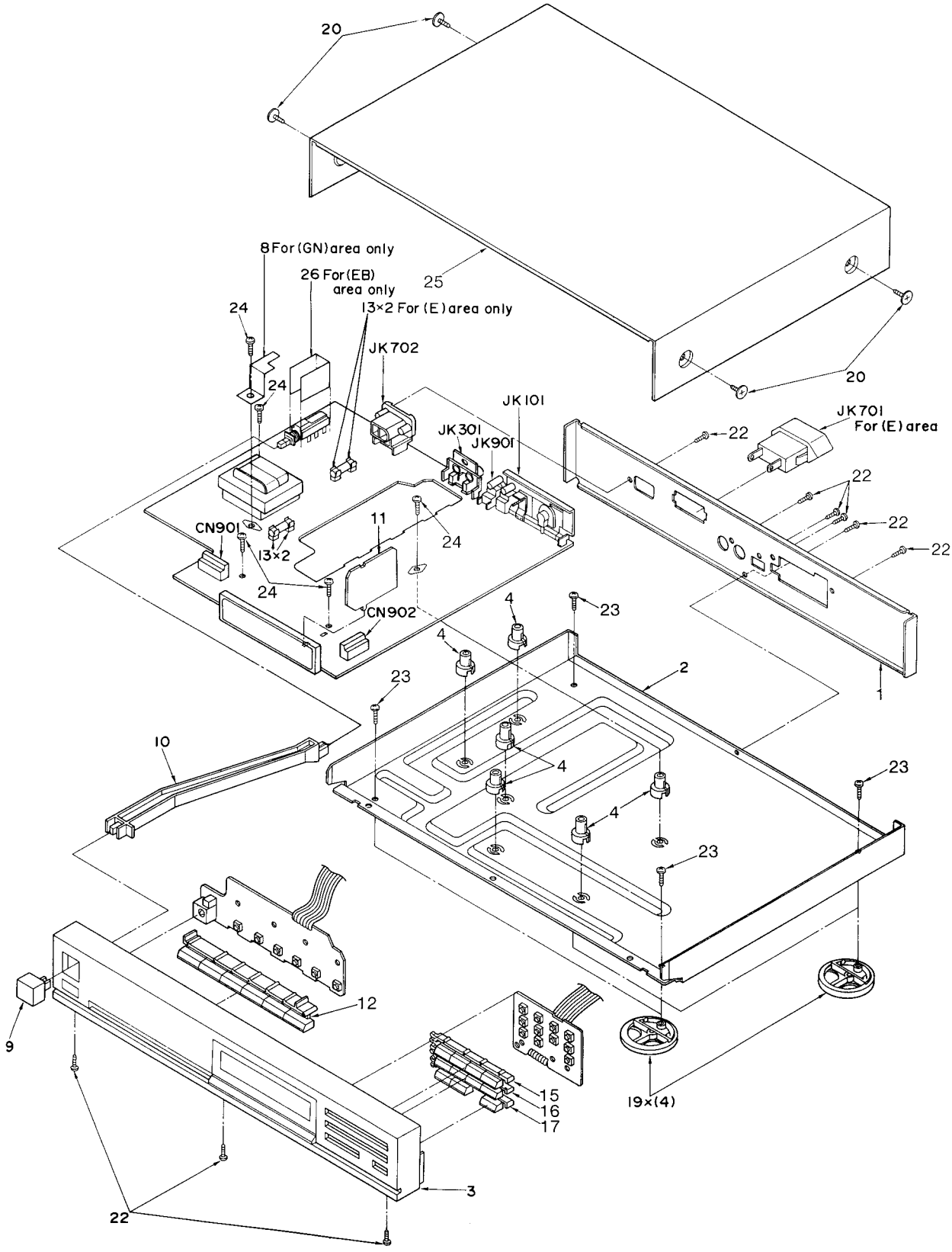
Ref. No.	Part No.	Part Name & Description	Remarks
S901~917	EVQQB005R	PUSH SWITCHES	
		JACKS	
JK101	SJF8305N	TERMINAL BOARD (ANT)	<E, EB>
JK101	SJF8402N	TERMINAL BOARD (ANT)	<GC, GN>
JK301	SJFD4	TERMINAL BOARD (OUTPUT)	
JK701	SJS9236	AC INLET	⚠ <E, EB, GC>
JK701	SJS9237	AC INLET	⚠ <GN>
JK702	SJS9225	AC OUTLET	⚠ <E>
JK702	SJS9330B	AC OUTLET	⚠ <GC>
JK702	SJS9332B	AC OUTLET	⚠ <EB>
JK901	RJS1A0203-0M	CONNECTOR (3P)	
CN901	SJT31043-V	CONNECTOR (10P)	
CN902	SJT30843-V	CONNECTOR (8P)	
		FUSES	
F1	XBA2C04TB0	FUSE, 0.4A 250V	⚠
F2	XBA2C25TB0	FUSE, 2.5A 250V	⚠ <E>
		RELAY	
RL701	SSY138	RELAY	⚠<E, EB, GC>

Ref. No.	Part No.	Part Name & Description	Remarks
		CABINET PARTS	
1	SGP7355A	REAR PANEL	<E>
1	SGP7357A	REAR PANEL	<GC>
1	SGP7358A	REAR PANEL	<GN>
1	SGP7359A	REAR PANEL	<EB>
2	SKU11651-4	BOTTOM BOARD	
3	RYP0072	FRONT PANEL	
4	SHE181	HOLDER	
8	SUS772	SPRING	<GN>
9	SBC666-1	POWER BUTTON	
10	SUB267	POWER SWITCH ROD	
11	SHR9862	HOLDER	
12	SBC1029A	BUTTON, TUNING/SELECT	
13	SJT390	FUSE HOLDER	
15	SBC989D	BUTTON, PRESET	
16	SBC989E	BUTTON, PRESET	
17	SBZ9104	BUTTON, PRESET/MEMORY	
19	SKL307	FOOT	
20	SNE2129-1	SCREW	
22	XTBS3+8JFZ1	SCREW	
23	XTB3+8G	SCREW	
24	XTB3+20J	SCREW	
25	SKC2061K16	CABINET	
26	RMZ0016	SHIELD PLATE	<EB>
28	SJS9330A	AC OUTLET COVER	<GC>
28	SJS9332A	AC OUTLET COVER	<EB>
		REMOTE CONTROLLER	
IC1	M50467018FP	I. C, SIGNAL CONTROL	
Q1	2SC3265Y	TRANSISTOR	
D1	SE303AWVFA	L. E. D.	
L1	ELEA101JA	COIL	
X1	CSB420PB6	OSILLATOR	
R1	ERD25TLJ1R0U	C. RESISTOR 1/4W 1.0	
C1, 2	ECUV1H471KCG	C. CAPACITOR 50V 470P	
C3	ECEA0GK101	E. CAPACITOR 4V 100U	
101	UR64VCS566	UPPER CABINET	<E, EG, GC>
101	UR64VCS859	UPPER CABINET	<GN>
102	UR64CS803A	LOWER CABINET	
103	UR64EC804	BATTERY COVER	
104	UR64CT805D	RUBBER SWITCH	<E, EG, GC>
104	UR64CT805M	RUBBER SWITCH	<GN>
105	UR52SB327	SMOKE PLATE	
106	UR64TD374	BATTERY TERMINAL (+/-)	
107	UR64TD808	BATTERY TERMINAL (+)	
108	UR64TD809	BATTERY TERMINAL (-)	

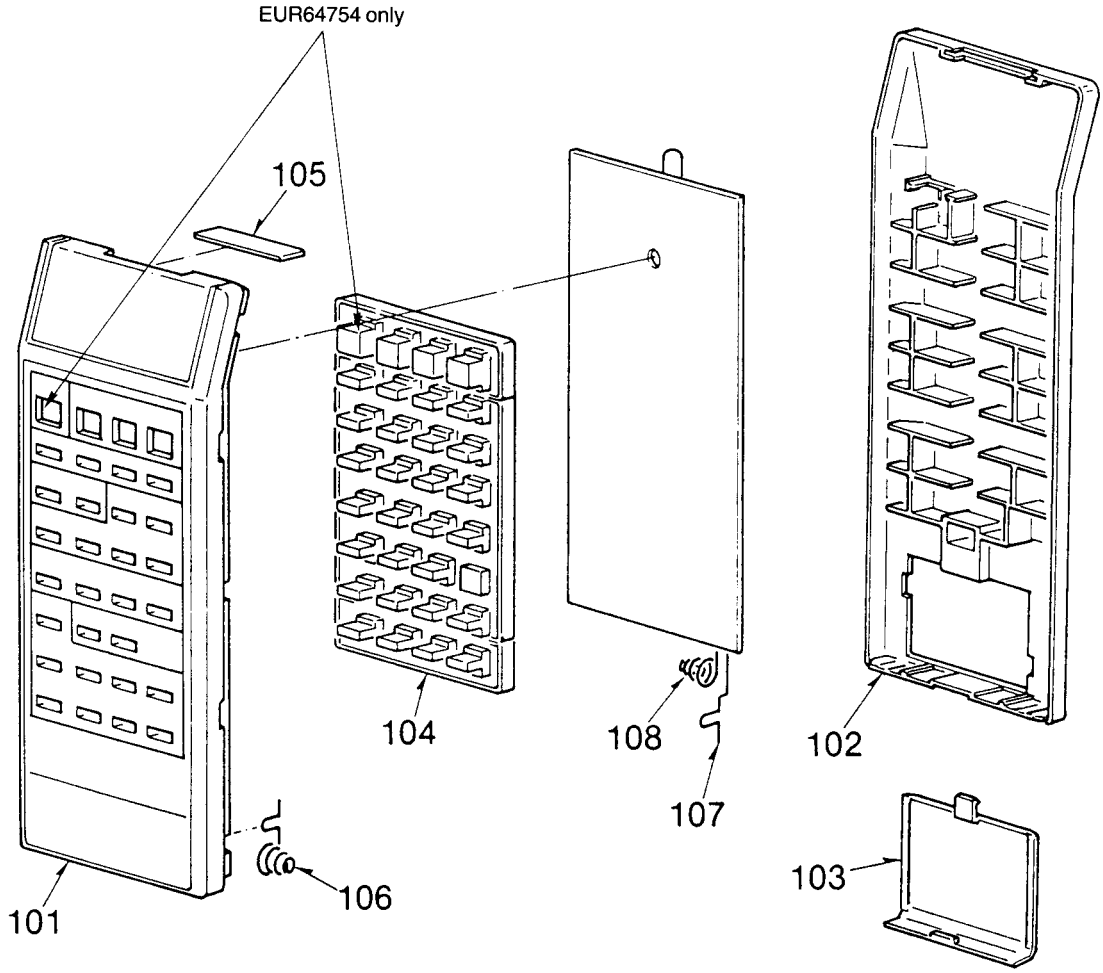
Ref. No.	Part No.	Part Name & Description	Remarks
		PACKING MATERIAL	
P1	RPG0170	PACKING CASE	<E, GC, GN>
P1	RPG0279	PACKING CASE	<EB>
P2	SPS5169	PAD	<E, GC, GN>
P2	RPN0171	PAD	<EB>
P3	SPS5170	PAD	<E, GC, GN>
P4	SPS5073	PAD	<E, GC, GN>
P4	SPS5303	PAD	<EB>
P5	SPP740	PROTECTION COVER	
		ACCESSORIES	
A1	SFDAC05E03	POWER CORD	⚠ <E>
A1	SJA193	POWER CORD	⚠ <EB>
A1	SJA173	POWER CORD	⚠ <GN>
A1	RJA0004	POWER CORD	⚠ <GC>
A2	SSA269M	FM ANTENA	<GC, GN>
A2	SSA270M	FM ANTENA	<E, EB>
A3	RQF0136	INSTRUCTIONS MANUAL	<E>
A3	RQF0270	INSTRUCTIONS MANUAL	<EB>
A3	RQF0137	INSTRUCTIONS MANUAL	<GC>
A3	RQF0138	INSTRUCTIONS MANUAL	<GN>
A4	SJPK2203-1	CORD	
A5	SJP9215	AC PLUG ADAPTOR	⚠ <GC>
A6	SPB1162T	AM LOOP ANTENA	
A7-1	SMA233-1M	HOLDER	
A7-2	SMA231M	HOLDER	
A7-3	XTB3+10AFZ	SCREW	
A8	SWKTX930E	LEAD WIRE	
A9	SJP9009	ATTACHMENT PLUG	<EB>
A101	EUR64754	REMOTE CONTROLLER	<E, EB, GC>
A101	EUR64776	REMOTE CONTROLLER	<GN>

■ EXPLODED VIEW





●REMOTE CONTROL UNIT (Parts list on page 22)



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